

1 CLAIMS

2  
3 What is claimed is:

4 Claim 1. Water-soluble supramolecular self-assemblies  
5 of a polyelectrolyte comprising:

6 at least one polyelectrolyte compound selected from the  
7 group consisting of diblock copolymers including ionizable  
8 units, permanently charged units or mixtures of ionizable  
9 and permanently charged units, multiblock copolymers  
10 including ionizable units, permanently charged units or  
11 mixtures of ionizable and permanently charged units, and  
12 random copolymers with grafted hydrophilic and essentially  
13 non-ionic oligomers or polymers, said random copolymers  
14 including ionizable units, permanently charged units or  
15 mixtures of ionizable and permanently charged units;

16 wherein a polyelectrolyte segment forms a core of the  
17 assembly and chemically bears non-ionic hydrophobic  
18 repeating units.

19  
20 Claim 2. The supramolecular self-assemblies of claim  
21 1, wherein:

22 said diblock copolymers include at least two blocks,

1 one of which is hydrophilic and essentially uncharged and  
2 another of which contains at least one repeating unit  
3 selected from the group consisting of ionizable or  
4 permanently-charged repeating units in combination with  
5 essentially hydrophobic monomers.

6

7 Claim 3. The supramolecular self-assemblies of claim  
8 2, wherein:

9 said ionizable units are repeating units that can be  
10 transformed from a non-ionic to a charged state via an  
11 external stimulus.

12

13 Claim 4. The supramolecular self-assemblies of claim  
14 3 wherein:

15 said external stimulus is selected from the group  
16 consisting of a change in pH or conduction of a chemical  
17 reaction.

18

19 Claim 5. The supramolecular self-assemblies of claim  
20 2, wherein:

21 said permanently charged units are repeating units that  
22 are electrostatically charged irrespective of external

1 conditions.

2

3 Claim 6. The supramolecular self-assemblies of claim  
4 2, wherein:

5 said ionizable or permanently-charged block, bearing  
6 hydrophobic repeating units, is synthesized from at least  
7 one hydrophobic compound selected from the group consisting  
8 of vinyl monomers, vinyl oligomers, and vinyl polymers.

9

10 Claim 7. The supramolecular self-assemblies of claim  
11 6, wherein;

12 said hydrophobic compound is at least one compound  
13 selected from the group consisting of acrylate, acrylamide,  
14 alkylacrylate, alkylacrylamide, arylacrylate and  
15 arylacrylamide derivatives.

16

17 Claim 8. The supramolecular self-assemblies of claim  
18 7, wherein:

19 said alkyl or aryl derivatives include at least one  
20 aliphatic or aromatic moiety selected from the group  
21 consisting of acrylate, acrylamide, methacrylate and  
22 methacrylamide derivatives.

1

2       Claim 9. The supramolecular self-assemblies of claim  
3 6, wherein:

4       said hydrophobic compound is at least one vinyl-  
5 terminated biodegradable polyester.

6

7       Claim 10. The supramolecular self-assemblies of claim  
8 9, wherein:

9       said vinyl terminated biodegradable polyester is  
10 selected from the group consisting of vinyl-terminated  
11 poly(lactide) and vinyl-terminated poly( $\epsilon$ -caprolactone).

12

13       Claim 11. The supramolecular self-assemblies of claim  
14 2, wherein:

15       said ionizable units include at least one compound  
16 selected from the group consisting of alkylacrylic acid  
17 derivatives, (aminoalkyl)acrylate derivatives, and  
18 (aminoalkyl)alkylacrylate derivatives.

19

20       Claim 12. The supramolecular self-assemblies of claim  
21 2, wherein:

22       said hydrophilic block is synthesized from at least one

1 hydrophilic compound selected from vinyl monomers, vinyl  
2 oligomers and vinyl polymers.

3

4 Claim 13. The supramolecular self-assemblies of claim  
5 12, wherein:

6 said hydrophilic compound is at least one compound  
7 selected from the group consisting of acrylate derivatives,  
8 acrylamide derivatives, alkylacrylate derivatives,  
9 alkylacrylamide, and N-vinyl-2-pyrrolidone derivatives.

10

11 Claim 14. The supramolecular self-assemblies of claim  
12 2, wherein:

13 said hydrophilic block originates from a macroinitiator  
14 based on poly(ethylene glycol) or poly(N-vinyl-2-  
15 pyrrolidone).

16

17 Claim 15. A pharmaceutical formulation comprising  
18 supramolecular self-assemblies of claim 1 in combination  
19 with an effective amount of at least one pharmacological  
20 constituent.

21

22 Claim 16. The pharmaceutical formulation of claim 15,

1 wherein the pharmacological constituent is a drug.

2

3 Claim 17. The pharmaceutical formulation of claim 15,  
4 wherein the pharmacological constituent is a peptide,  
5 protein or genetic material.

6

7 Claim 18. The pharmaceutical formulation of claim 15,  
8 including a targeting ligand.

9

10

11

12

13

14

15

16

17

18

19

20

21

22